National Institute of Environmental Health Sciences

Progress towards understanding the ecology and epidemiology of malaria in the western Kenya highlands: opportunities and challenges for control under climate change risk

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Abstract:

Following severe malaria epidemics in the western Kenya highlands after the late 1980s it became imperative to undertake eco-epidemiological assessments of the disease and determine its drivers, spatial-temporal distribution and control strategies. Extensive research has indicated that the major biophysical drivers of the disease are climate change and variability, terrain, topography, hydrology and immunity. Vector distribution is focalized at valley bottoms and abundance is closely related with drainage efficiency, habitat availability, stability and productivity of the ecosystems. Early epidemic prediction models have been developed and they can be used to assess climate risks that warrant extra interventions with a lead time of 2-4 months. Targeted integrated vector management strategies can significantly reduce the cost on the indoor residual spraying by targeting the foci of transmission in transmission hotspots. Malaria control in the highlands has reduced vector population by 90%, infections by 50-90% in humans and in some cases transmission has been interrupted. Insecticide resistance is increasing and as transmission decreases so will immunity. Active surveillance will be required to monitor and contain emerging threats. More studies on eco-stratification of the disease, based on its major drivers, are required so that interventions are tailored for specific ecosystems. New and innovative control interventions such as house modification with a one-application strategy may reduce the threat from insecticide resistance and low compliance associated with the use of ITNs.

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Resource Description

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : highlands

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Kenya

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Intervention: ☑

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified